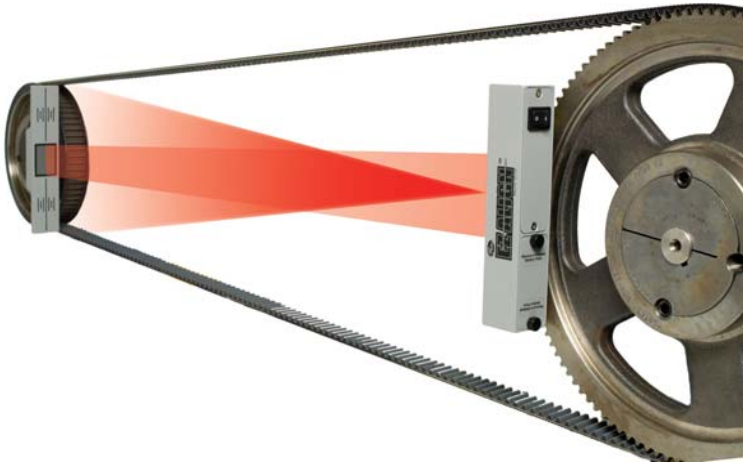
The World's Most Trusted Name in Belts, Hose and Hydraulics.

PRECISION LASER ALIGNMENT OPERATING INSTRUCTIONS



www.gates.com/pt

The Driving Force In Power Transmission

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Thank you for your purchase of the **GATES EZ ALIGN**® laser alignment system. These instructions are intended to introduce you to your new laser pulley alignment system. We are confident that the **GATES EZ ALIGN**® will bring you many years of productive service if used properly. The **GATES EZ ALIGN**® system consists of two units; the laser transmitter and the reflector. Each system is equipped with powerful magnetic brackets that will mount to almost ***any*** pulley or sprocket.

GATES EZ ALIGN® is the answer to misalignment in belt driven machinery. **GATES EZ ALIGN**® replaces the old inaccurate methods of pulley alignment such as straight edge, string line, and the human eye - all techniques with plenty of room for error.

In today's demanding maintenance arena where tighter specifications and speedier results are a must,
GATES EZ ALIGN® provides the accuracy and reliability that other traditional ways cannot. And since time and manpower is of the essence,
GATES EZ ALIGN® is your solution. It is so simple to use that it requires no training and a single operator can do the job!

At the **GATES CORPORATION**, we strive to produce high quality documentation and products and welcome your feedback. If you have any comments or suggestions about this or any other of our documents, please get in touch with us.

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Foreword

Welcome to laser pulley alignment using **GATES EZ ALIGN**®. This patented easy to use device from **GATES CORPORATION** will enable the user perform pulley alignment tasks with ease and precision.

An aligned pulley system reduces both pulley and belt wear, and reduces vibration of machinery, which in turn leads to improved machine performance. Good pulley alignment reduces unscheduled downtime, and improves the reliability of your equipment.

GATES EZ ALIGN® brings to the world of pulley alignment **GATES CORPORATION**'s innovative approach to alignment. The process is simple and utilizes **Gates**' tested, proven and well known reflected laser beam technology.

This document is intended not only to guide the **GATES EZ ALIGN**® user on the operations of the system but also provide useful and related information to the reader.

At the **GATES CORPORATION**, we strive to produce documentation that is of good quality, and therefore welcome your feedback. If you have comments or suggestions about this or any of our documentation you can let us know by mail, fax or through the internet at www.gates.com/pt.

GATES CORPORATION
May 2011
Revision 2.4
Denver, Colorado USA

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GATES EZ ALIGN® 7420-1000 System consisting of:

EZ ALIGN	Laser Transmitter with AAA alkaline batteries Class II laser diode
EZ ALIGN	Reflector Unit
Carrying Case	High density polyethylene carrying case with die cut foam insert
User's Manual	

7420-1000 GATES EZ ALIGN® with carrying case and cut foam insert

EZ ALIGN Laser Transmitter

EZ ALIGN Reflector

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INTENDED USE

The **GATES EZ ALIGN**® is designed for use in industrial environments where belt driven systems have to be aligned. Due to its simplicity, alignment using **GATES EZ ALIGN**® requires only one operator. **GATES CORPORATION** assumes no liability for damage or injury resulting from uses other than those described in this document.

CE COMPLIANCE

GATES EZ ALIGN® conforms to all relevant CE requirements.
Per Annex II.B of the Machinery Directive (98/37/EC)
IEC608-25-1 EN 60825-1

LASER SAFETY

The **GATES EZ ALIGN**® system uses a Class II laser. Class II lasers comply with the requirements outlined in the FDA specification 21 CFR Ch. 1, Parts 1040.10 and 1040.11, as well as ANSI standards. The **GATES EZ ALIGN**® operates at a wavelength of 635nm or 650nm wavelength.
DO NOT look into the laser beam at any time; this includes during set-up and adjustment of operation.

CALIBRATION

The **GATES EZ ALIGN**® is factory calibrated and therefore should not require any adjustments. It is recommended however, that the unit be returned to the factory or an authorized service center each year for calibration.

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CAUTION !!

ALWAYS LOCK-OUT THE ELECTRICAL POWER TO THE MOTOR PRIOR TO PERFORMING ANY MAINTENANCE

FAILURE TO DO SO COULD RESULT IN SERIOUR INJURY OR DEATH TO PERSONEL AND MAY CAUSE DAMAGE TO EQUIPMENT

BATTERY OPERATION

GATES EZ ALIGN® is powered with 2 AAA alkaline batteries with an operating time of approximately 25 hours. To replace the depleted batteries, simple remove the two thumb screws on the back of the transmitter to expose the two AAA batteries and replace them.

Battery Thumb Screws

2 AAA Alkaline Batteries

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MAGNETIC BRACKETS

Powerful magnetic brackets hold the **GATES EZ ALIGN®** firmly in place

Due to the powerful magnets on the **GATES EZ ALIGN®** units, it is recommended that the assembly be handled with care. The units should be kept away from magnetic materials such as watches, spectacle frames and other units that can be damaged.

When not in use, the **GATES EZ ALIGN®** magnetic units should be stored in their durable case.

For maximum performance ensure that the optics on the laser transmitter, the reflecting surface on the reflector and the outside housing of both units are kept clean and dust free. The units may be cleaned with lint free cloth or swab using a premium glass cleaner solution.

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Getting started

GATES EZ ALIGN® SET-UP

Pulley alignment has never been so simple. Open the **GATES EZ ALIGN®** case and remove the two compact and durable units that compose the alignment system. Turn on the laser by switching the laser unit on using the rocker switch located on the back of the transmitter.

Do not look into the laser beam at anytime. Ensure that the machinery or equipment to be aligned has been locked out and tagged out.

Mount the units on the pulley faces to be aligned. The reflector should be mounted onto the pulley to be moved or adjusted, while the laser transmitter should be mounted onto the stationary pulley. The operator should determine which pulley is movable and which is stationary. The movable pulley is often the smallest one, and is often mounted to the motor shaft. In some cases both pulleys and shafts may need to be adjusted to achieve the desired alignment.

Check to see if the offset distance from the pulley mounting face to the groove is the same for both pulleys. If not, the optional Offset Bracket Kit may be very helpful.

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STANDARD MAGNETIC MOUNTING

The **GATES EZ ALIGN**® is equipped with a powerful magnet bracket assembly, allowing the operator to mount the system on almost any pulley face, fast and easy.

NONFERROUS PULLEYS AND SPROCKETS MOUNTING

When mounting to a nonferrous pulley or a sprocket, the **GATES EZ ALIGN**® can be easily mounted by using an optional QUICK-GRIP Micro One-Handed Bar Clamp.

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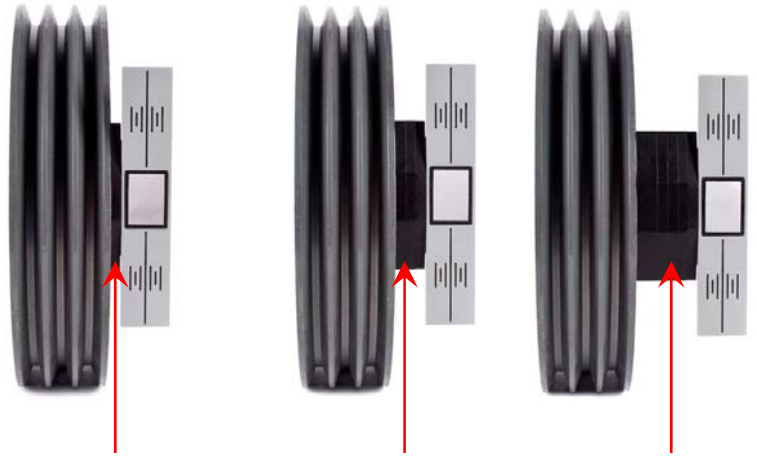
OFFSET BRACKET KIT (Optional)

The Offset Bracket Kit is used with pulleys when a large offset is required. The kit includes 1ea - 1/2" and 1ea. - 3/4" offset brackets. Combine both offset brackets for a total 1 1/4" offset.

Standard Bracket ½ Offset Bracket ¾ Offset Bracket



Standard Bracket ½ Offset Bracket ¾ Offset Bracket

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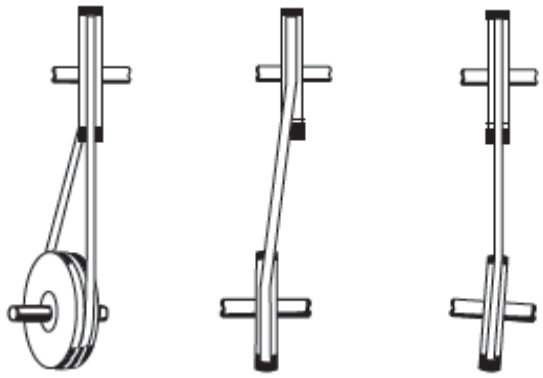
ALIGNMENT CONDITION CHECK

The misalignment conditions to be checked include vertical angularity, horizontal angularity and offset. The position of the transmitted laser line on the *reflector* indicates the vertical angularity and the offset. Horizontal angularity is indicated by the position of the reflected laser line on the *transmitter*.

TYPICAL MACHINE MISALIGNMENT CONDITIONS

Vertical Angularity Offset Horizontal Angularity



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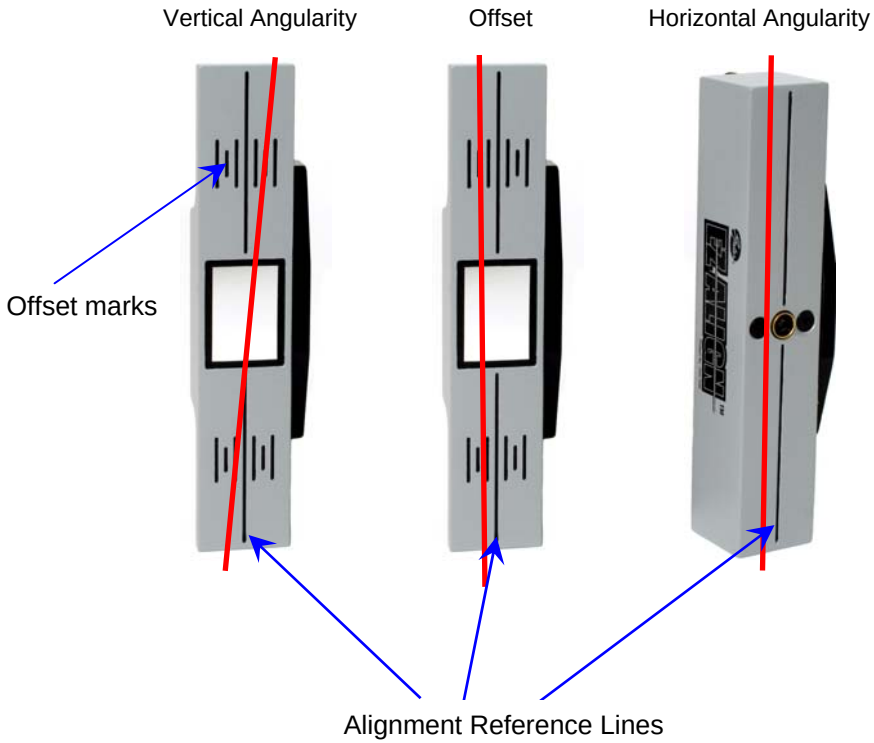
MISALIGNMENT CONDITIONS AS THEY ARE SHOWN ON THE GATES EZ ALIGN®



For different pulley edge thicknesses, use the offset marks on the face of the reflector to establish the amount of offset. The marks are in 1/8 inch increments.

Alignment processes should be carried out in an area protected from bright sunlight, or a shaded area in order to allow easy viewing of the laser line on the **GATES EZ ALIGN®** units.

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CORRECTING PULLEY MISALIGNMENT

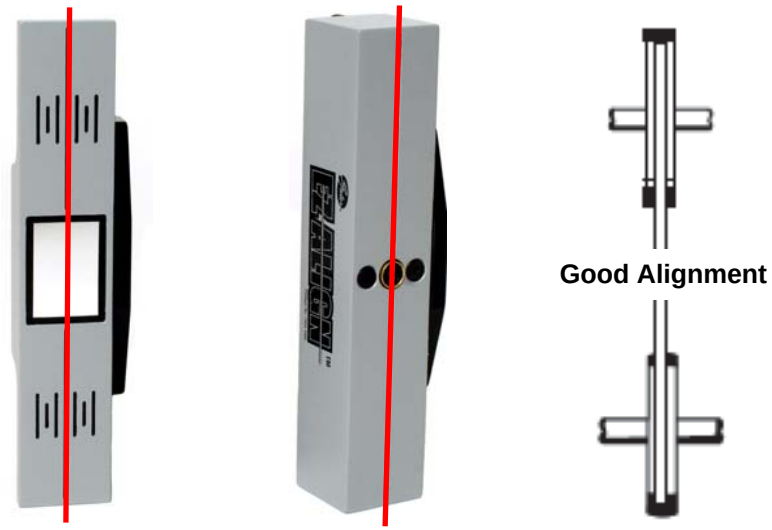
1. Correct vertical angularity by shimming the moveable machine using precut 304 stainless steel shims. Correction of this angular misalignment can be observed on the reflector.

2. Correct offset by adjusting the moveable pulley or machine axially. This correction can also be observed on the reflector unit.

3. Correct horizontal angularity by adjusting the moveable machine laterally. This can be viewed on the laser transmitter during adjustment.

By following the three steps above, alignment of the belt drives should be completed quickly. However, one alignment correction may affect other alignment conditions, so the procedures above may need to be repeated until the system is completely aligned.

Good alignment is achieved when the transmitter laser line and the corresponding reflected laser line coincide with the reference lines on the reflector and laser transmitter respectively.



Good Alignment

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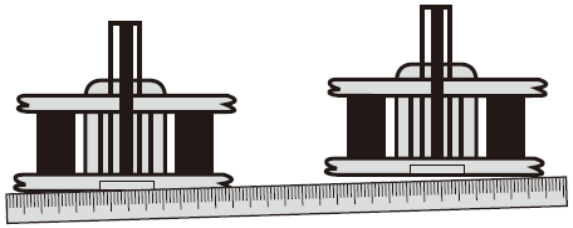
IMPORTANCE OF GOOD PULLEY ALIGNMENT

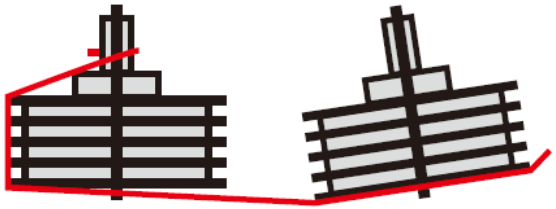
Good pulley alignment increases belt drive reliability and efficiency by reducing premature wear or failure of pulleys, belts and bearings. Pulleys can be aligned using conventional string and straight-edge methods, but this is often time consuming and prone to error.

GATES EZ ALIGN® is a laser system specifically designed for the alignment of belt driven equipment. Patented and proven reflected laser beam technology significantly helps to reduce drive installation time, manpower and potential errors associated with pulley alignment and installation.

The **GATES EZ ALIGN**® system uses a return beam angle that is twice the angle of incidence, so the reflected beam travels twice the distance, dramatically enhancing accuracy. Alignment is indicated with great accuracy, resulting in labor savings and increased production uptime.



Straight-Edge Method



String Line Method

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MACHINE PREPARATION

Before commencing any work ensure basic safety rules are adhered to.

Loose clothing or long hair must never be allowed anywhere near belt-driven machinery. All equipment MUST be locked out and tagged out.

CAUSES OF BELT FAILURE

Before beginning any pulley alignment, causes of belt or pulley failure must be examined and corrected to prevent recurrence. Causes of failure could include poor drive maintenance (wrong belt tension, pulley misalignment), environmental factors (sunlight, harsh temperature fluctuations), improper installation (wrong belts/sheaves, belts forced onto grooves), or operating factors (overload, shock load).

INSPECTION

Perform a visual inspection of the belts and of each pulley and its grooves. Look for and feel for cracks, chips, or excessive groove wear. Proper contact between the belts and the pulleys must be ensured.

Worn belts or pulleys and other components should be replaced before proceeding with pulley alignment.

PULLEY ALIGNMENT

SOFT FOOT

Inspect the moveable machine for “soft foot”. Feeler gauges can be used under a loosened foot to measure the gap. Shim the machine foot with the largest amount of gap (the amount indicated with the feeler gauges) until no reading is larger than 0.05mm (0.002” or 2 mils). Use precut 304 stainless steel shims. Severe “soft foot” distorts the machine frame when bolted down, causing damage to seals and bearings. It could also lead to high vibration levels on the machine bearings.

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DRIVE BELTS

The condition of the worn belt is a good indication of the type of misalignment or other problems that may be present. Belts must be changed as soon as undue wear is detected. For a multiple-belt drive, all belts must be replaced together. Only belts from the same manufacturer should be combined together in order for the belts to share the load equally.

In order to replace the belts on a belt drive system, they must first be loosened. This is often accomplished by simply loosening the driver or driven unit and reducing the center distance. In other cases, an idler pulley may need to be loosened and moved. Belts must never be forced or rolled onto a pulley as this can damage the pulley as well as the belt tensile cord.

New belts must be properly stored. They should be kept in a cool, dry place with no exposure to direct sunlight or heat. They also should not be hung from single pegs. For further information, refer to Gates “Belt Drive Preventative Maintenance & Safety Manual”.

PULLEYS

If installing new pulleys and belts ensure that the correct-belt-pulley combination and the correct size belts have been selected. Existing pulleys should be inspected carefully for wear and replaced if necessary. Consult the Gates “Belt Drive Preventative Maintenance & Safety Manual”.

PULLEY RUN-OUT

Axial pulley run out will influence alignment readings. Axial run out should be confirmed to be within recommended limits.

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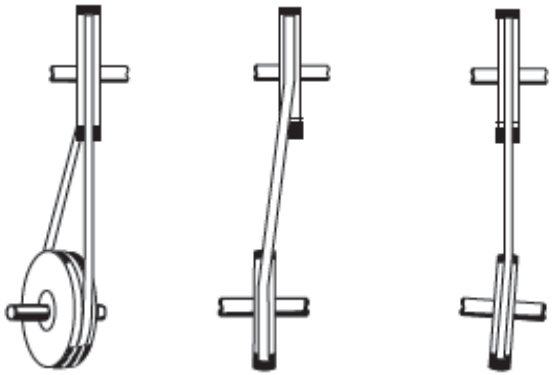
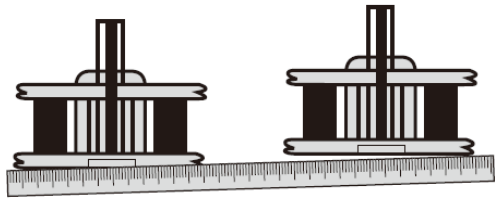
ALIGNMENT

There are three basic parameters that describe pulley misalignment. These include vertical angularity, horizontal angularity, and axial offset and may occur in any combination.

Vertical Angularity Offset Horizontal Angularity



There are several pulley alignment methods. The most common is the straightedge and string method in which the strings must touch the two edges of each pulley face simultaneously (four-point contact for drives with two pulleys). The pulleys should be rotated half a turn and checked again. Since a string can bend around corners, it is not easy differentiating between offset and horizontal angularity when only three-point contact is made. A straightedge or string also cannot always detect twist angle.



Straight-Edge Method

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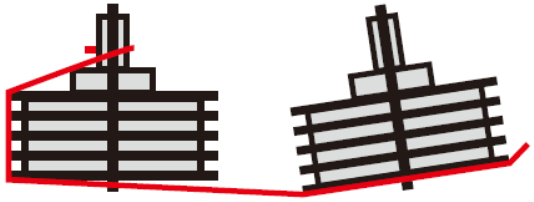
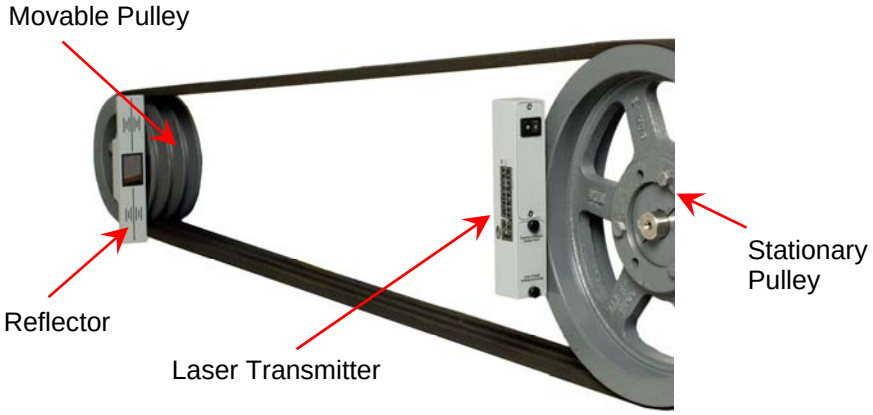


String Line Method

The **GATES EZ ALIGN**® on the other hand mounts magnetically to the face of most pulleys. It projects a laser line onto the reflector which is magnetically attached to the other pulley face. Alignment involves ensuring that the transmitted and reflected laser lines match with the respective reference lines.



The diagrams below depict misalignment conditions using the **GATES EZ ALIGN**® and the corresponding corrections as observed on the units.

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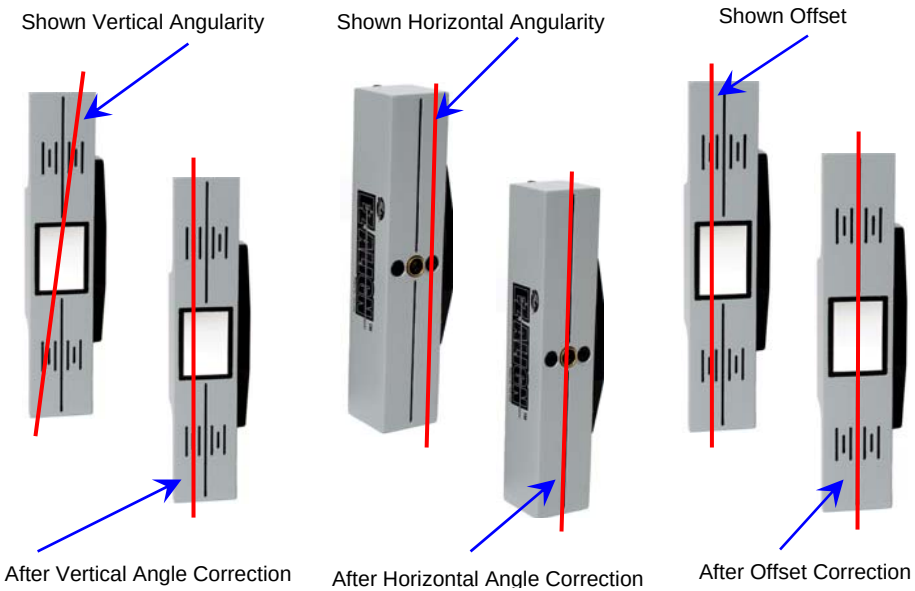

Vertical angularity should be corrected first. This is done by shimming the unit that the movable pulley is mounted to. The next step is to correct horizontal angularity. This is accomplished by shifting or twisting the position of the unit that the movable pulley is mounted to. Use lateral jackscrews if available, otherwise the unit will need to be loosened and re-positioned. Finally, correct offset by moving the unit that the movable pulley is mounted to axially or reposition one of the pulleys on its shaft. Since performing one alignment correction almost invariably affects the other alignment conditions, this process may have to be repeated several times.

The sequence in which the misalignment correction is carried out may vary from one situation to the next.

GATES EZ ALIGN® enables all three alignment conditions to be monitored simultaneously. The accuracy of the alignment is greatly increased and the process can be completed quickly and easily.

Incorrect belt tension (as well as pulley misalignment) adversely affects belt drive reliability and efficiency. After the

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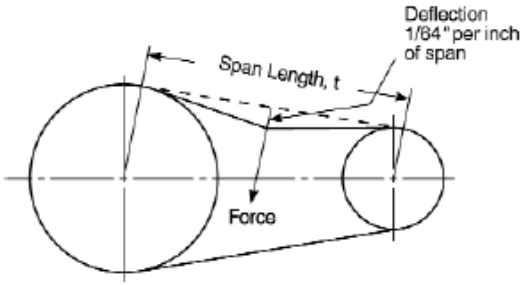
pulleys have been aligned, it is very important to tension the belts to manufacturer's recommendations.



Force – Deflection Method of belt tensioning:

1. Measure the belt span length and calculate the desired deflection distance (1/64" per inch of span length)

2. Using a spring scale, press down on the belt in the approximate center of the span, and deflect the belt to the desired level. When the desired deflection distance has been reached, note the force registered on the spring scale.

3. Adjust belt tension until the force required to achieve the desired deflection distance is within the belt manufacturer's recommended force values for the type of belts being used. New belts generally require higher tension levels than used belts because they have not been run in.

It is possible for belt tension adjustments to alter pulley alignment, and for pulley alignment adjustments to alter belt tension levels. The **GATES EZ ALIGN®** tool will help monitor the pulley alignment condition as belts are adjusted for the correct tension level.

Measuring belt tension with the Gates Sonic Tension Meter::

The Gates Sonic Tension Meter measurers belt span tension easily and accurately. Belt tension is measured by plucking the belt span while holding a sensor close by. Belt tension is adjusted until the belt span frequency, or measured tension level is within manufacturer's recommendations.

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The final step is to operate the belt drive system for a few hours, allowing the belts to stretch and seat properly in the pulley grooves. The belt tension level should then be checked to make sure it is within manufacturer's recommendations for new belts. Now operate the belt drive for at least 72 hours. The belt tension level should be checked again to make sure it is within manufacturer's recommendations for used belts.

Before operating the machinery check to make sure all tools and equipment have been stowed securely, and all guards have been securely replaced.

MAINTENANCE

The **GATES EZ ALIGN**® is designed with durable aluminum housing designed to withhold harsh environments. However, as with any precision instrument, care should be taken to avoid unnecessary abuse.

1. The lenses of the transmitter and reflector windows are coated with a high performance film. To clean, use a lint free cloth or swab using a premium glass cleaner solution.

2. The outside aluminum housing may be cleaned with a clean damp cloth.

REPAIR / SERVICE INSTRUCTIONS

1. Pack the equipment securely for shipment in the original carrying case.

2. Enclose a note or letter including contact information and the nature of the request or problem. If the unit is under warranty, provide confirmation of the purchase date.

3. If requested, estimates for non-warranty repairs will be provided, otherwise work will begin as soon as possible.

4. Return the equipment prepaid and insured to the **GATES CORPORATION** Service Center. For quick turn around, "2nd Day Air" or air shipment is recommended.

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There will be no charge for repairs within the warranty period due to defective materials and/or workmanship after the unit has been received.

FOR REPAIRS SEND UNITS TO:

GATES CORPORATION
c/o Seiffert Industrial, Inc.
Attn: Service Department
1323 Columbia Drive, Suite 305
Richardson, TX 75081 USA

800-777-6363

STATEMENT OF LIMITED WARRANTY

GATES CORPORATION warrants the **GATES EZ ALIGN**® to be free of defects in material and workmanship for a period of two (2) years. This twenty four (24) month warranty period begins when the unit is received by the purchaser.

GATES CORPORATION will repair or replace, at its option, any defective part of components of which notice has been given during the warranty period. Travel and per diem expensed, if required, to and from the place where repairs are made, will be charged to the purchaser at the prevailing rates.

Customers should send units to **GATES CORPORATION** (use address above) for warranty repairs; freight prepaid.

Any evidence of negligent, abnormal use, or accident with exception of the previously stated warranty or an attempt to repair equipment by other factory authorized personnel using **GATES CORPORATION** certified or recommended parts, automatically voids the warranty.

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Special precautions have been taken to assure proper calibration, however calibration is not covered by this warranty. Calibration maintenance is the responsibility of the user.

The foregoing states the entire liability of **GATES CORPORATION** regarding the purchase and use of its equipment. **GATES CORPORATION** will not be held responsible for any consequential loss or damage of any kind.

This warranty is in lieu of all other warranties, except as set forth above, including any implied warranty merchantability or fitness for a particular purpose, are hereby disclaimed. This warranty is in lieu of all other warranties, expressed or implied.

RECOMMENDED PULLEY ALIGNMENT VALUES

The standard limit for V-belt drive alignment is 0.5 degrees, and 0.25 degrees for synchronous drives. Most major belt and pulley manufacturers specify these values. Pulley alignment can be set closer than this if the alignment procedure is carefully followed. The following table converts degrees of misalignment to mils/inch and mm/100 (of pulley diameter) of misalignment between the projected planes of the pulley faces.

Angle Of Misalignment (degrees)	mm / 100mm	mils / inch
0.1	**0.18**	**1.75**
0.2	**0.35**	**3.49**
0.3	**0.52**	**5.24**
0.4	**0.70**	**6.98**
0.5	**0.87**	**8.73**
0.6	1.05	10.47
0.7	1.22	12.22
0.8	1.40	13.96
0.9	1.57	15.71
1.0	1.74	17.45

Bold = within recommended limits for V-belt drives

Note that the values between 0.1 and 0.5 fall within recommended misalignment limits for V-belt drives.

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GATES EZ ALIGN® TECHNICAL DATA

EZ ALIGN® LASER TRANSMITTER

Operating Distance:	6 Ft. or Better
Accuracy:	1/32” At 6 Ft.
Laser Type:	635nm Visible Laser Diode
Laser Power:	<1 mW, Class 2
Laser Line Length:	28” At 6 Ft.
Controls:	Laser ON/OFF Rocker Switch
Operating Time:	25 Hours Continuous At 72° F
Battery Type:	2 AAA Alkaline Batteries
Operating Temp:	15° To 110° F
Storage Temp:	-4° To 140° F
Mounting:	Magnetic
Weight:	10.1 Oz.
Dimensions:	1.25” (W) X 1.25” (D) X 6.5” (H)
Housing:	Aluminum, Powder Coat Finish

EZ ALIGN® REFLECTOR

Reflector Size:	1” (W) X 1.4” (H)
Mounting:	Magnetic
Weight:	6.2 Oz.
Dimensions:	1.25” (W) X .75” (D) X 6.5” (H)
Housing:	Aluminum, Powder Coat Finish

CARRYING CASE

Material:	Black, High Density Polyethylene
Dimensions:	10.25” (W) X 8” (D) X 3” (H)
Insert:	Die Cut Foam
Total Package Weight:	1.9 Lbs.

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Visit our website **www.gates.com/pt** for information on new products, accessories and technical applications.

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